|  |  |
| --- | --- |
| Activity | Data Type |
| Number of beatings from Wife | Discrete |
| Results of rolling a dice | Discrete |
| Weight of a person | Continuous |
| Weight of Gold | Continuous |
| Distance between two places | Continuous |
| Length of a leaf | Continuous |
| Dog's weight | Continuous |
| Blue Color | Discrete |
| Number of kids | Discrete |
| Number of tickets in Indian railways | Discrete |
| Number of times married | Discrete |
| Gender (Male or Female) | Discrete |

Q1) Identify the Data type for the Following:

Q2) Identify the Data types, which were among the following

Nominal, Ordinal, Interval, Ratio.

|  |  |
| --- | --- |
| Data | Data Type |
| Gender | Nominal |
| High School Class Ranking | Ordinal |
| Celsius Temperature | Interval |
| Weight | Ratio |
| Hair Color | Nominal |
| Socioeconomic Status | Ordinal |
| Fahrenheit Temperature | Interval |
| Height | Ratio |
| Type of living accommodation | Ordinal |
| Level of Agreement | Ordinal |
| IQ(Intelligence Scale) | Interval |
| Sales Figures | Ratio |
| Blood Group | Nominal |
| Time Of Day | Ratio |
| Time on a Clock with Hands | Ratio |
| Number of Children | Ordinal |
| Religious Preference | Nominal |
| Barometer Pressure | Nominal |
| SAT Scores | Ordinal |
| Years of Education | Ratio |

Q3) Three Coins are tossed, find the probability that two heads and one tail are obtained?

Ans:- Total Possible Events: 8 , No of desired events: 3

The Probability is 3/8

Q4) Two Dice are rolled, find the probability that sum is

1. Equal to 1
2. Less than or equal to 4
3. Sum is divisible by 2 and 3

Ans:- a) 0

b) 1/6 = 0.167

c) 1/6 = 0.167

Q5) A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?

Ans:- 10/21= 0.4761

Q6) Calculate the Expected number of candies for a randomly selected child

Below are the probabilities of count of candies for children (ignoring the nature of the child-Generalized view)

|  |  |  |
| --- | --- | --- |
| CHILD | Candies count | Probability |
| A | 1 | 0.015 |
| B | 4 | 0.20 |
| C | 3 | 0.65 |
| D | 5 | 0.005 |
| E | 6 | 0.01 |
| F | 2 | 0.120 |

Child A – probability of having 1 candy = 0.015.

Child B – probability of having 4 candies = 0.20

Ans:- 1\*0.015 + 4\*0.20 + 3\*0.65 + 5\*0.005 + 6\*0.01 + 2\*0.12

= 0.015 + 0.8 + 1.95 + 0.025 + 0.06 + 0.24

= 3.09

7) Calculate Mean, Median, Mode, Variance, Standard Deviation, Range & comment about the values / draw inferences, for the given dataset

* For Points,Score,Weigh>

Find Mean, Median, Mode, Variance, Standard Deviation, and Range and also Comment about the values/ Draw some inferences.

**Use Q7.csv file**

Ans:- Points=> Mean: 3.596563

Median: 3.695

Standard deviation: 0.534679

Mode: 3.92

Range: 2.17

Variance: 0.285881

Score=> Mean: 3.21725

Median: 3.325

Standard deviation: 0.978457

Mode: 3.44

Range: 3.91

Variance: 0.957379

Weight=> Mean: 17.84875

Median: 17.71

Standard deviation: 1.786943

Mode: 17.02

Range: 8.4

variance: 3.193166

* No case has the variable Mean = Median = Mode
* Thus as seen in the graph dataset “score” and “Weight” has outliers

Q8) Calculate Expected Value for the problem below

1. The weights (X) of patients at a clinic (in pounds), are

108, 110, 123, 134, 135, 145, 167, 187, 199

Assume one of the patients is chosen at random. What is the Expected Value of the Weight of that patient?

Ans:- (1/9) X (1308)

= 145.33

**Q9) Calculate Skewness, Kurtosis & draw inferences on the following data**

**Cars speed and distance**

**Use Q9\_a.csv**

Ans:- Speed=> Skew= -0.11395

Kurtosis= -0.5771

Distance=> Skew= 0.78248

Kurtosis= 0.24801

Inferences:

* Speed is negative skewed, it is left skewed
* Distance is positive skewed ,it is right skewed
* Speed is negative kurtosis, the peakness is wide
* Distance is positive kurtosis, the peakness is short

**SP and Weight(WT)**

**Use Q9\_b.csv**

Ans:- SP=> Skew = 1.5814

Kurtosis = 2.7235

WT => Skew = -0.6033

Kurtosis = 0.8194

Inferences:

* SP postively skewed and WT is negatively skewed.
* both SP and WT has positive kurtosis.

**Q10) Draw inferences about the following boxplot & histogram**



Ans:- This is right skewed Histogram and its skewness is seen to be positive



Ans:- This is a 6 point chart and it is going to give the information about :

Median value, lower limit, Upper limit and outliers

**Q11)** Suppose we want to estimate the average weight of an adult male in Mexico. We draw a random sample of 2,000 men from a population of 3,000,000 men and weigh them. We find that the average person in our sample weighs 200 pounds, and the standard deviation of the sample is 30 pounds. Calculate 94%,98%,96% confidence interval?

Ans:- 94% = (198.738325292158 , 201.261674707842)

98% = (198.43943840429978 , 201.56056159570022)

96% = (198.62230334813333 , 201.37769665186667)

**Q12)** Below are the scores obtained by a student in tests

**34,36,36,38,38,39,39,40,40,41,41,41,41,42,42,45,49,56**

1. Find mean, median, variance, standard deviation.

Ans:- Mean = 41

Median = 40.5

Variance = 25.53

Standard Deviation = 5.052

1. What can we say about the student marks?

Ans:- Mean is greater than Median

It is right skewed and contains no outliers

Q13) What is the nature of skewness when mean, median of data are equal?

Ans:- It is perfectly symmetrical. Hence, skewness value will be zero

Q14) What is the nature of skewness when mean > median ?

Ans:- It is right skewed. Hence, skewness value will be Positive

Q15) What is the nature of skewness when median > mean?

Ans:- It is left skewed. Hence, skewness value will be Negative

Q16) What does positive kurtosis value indicates for a data ?

Ans:- It indicates that a distribution is peaked and possess thick tails

Q17) What does negative kurtosis value indicates for a data?

Ans:- It indicates that a distribution is flat and has thin tails

Q18) Answer the below questions using the below boxplot visualization.



What can we say about the distribution of the data?

Ans:- The data is not symmetric. Data is more concentrated towards right side

What is nature of skewness of the data?

Ans:- Left Skewed

What will be the IQR of the data (approximately)?

Ans:- IQR data is 8 (18-10=8)  
  
Q19) Comment on the below Boxplot visualizations?



Draw an Inference from the distribution of data for Boxplot 1 with respect Boxplot 2.

Ans:- Medium is same for both graph, there is difference between upper limit and lower limit (IQR1-IQR2) and there is no outliers in both the boxplot

Q20) Calculate probability from the given dataset for the below cases

Data \_set: Cars.csv

Calculate the probability of MPG of Cars for the below cases.

MPG <- Cars$MPG

* 1. P(MPG>38)
  2. P(MPG<40)
  3. P (20<MPG<50)

Ans:- Mean= 34.42

Standard deviation=9.13

P(MPG>38) = 0.2748

P(MPG<40) = 0.6511

P (20<MPG<50) = 0.9557

Q21) Check whether the data follows normal distribution

1. Check whether the MPG of Cars follows Normal Distribution

Dataset: Cars.csv

Ans:- MPG of cars does not follows normal distribution. The mean is not equal to median

1. Check Whether the Adipose Tissue (AT) and Waist Circumference(Waist) from wc-at data set follows Normal Distribution

Dataset: wc-at.csv

Ans:- Waist follows normal distribution

mean=median

Q22) Calculate the Z scores of 90% confidence interval,94% confidence interval, 60% confidence interval

Ans:- Z scores of:

90% = 1.645

94% = 1.880

60% = 0.842

Q23) Calculate the t scores of 95% confidence interval, 96% confidence interval, 99% confidence interval for sample size of 25

Ans:- T-Score:

95% = 2.064

96% = 2.171

99% = 2.797

Q 24**)** A Government company claims that an average light bulb lasts 270 days. A researcher randomly selects 18 bulbs for testing. The sampled bulbs last an average of 260 days, with a standard deviation of 90 days. If the CEO's claim were true, what is the probability that 18 randomly selected bulbs would have an average life of no more than 260 days

Hint:

rcode 🡪 pt(tscore,df)

df 🡪 degrees of freedom

Ans:- t = -0.4714045207910317

Degree of freedom = 17

Probability: 0.32167411684460556